REMARKS

Claims 55-57, 59, 69, 70, 72 and 84-89 are pending in the present application. In the Office Action dated June 23, 2003, the Examiner rejected claims 85 and 88 under 25 U.S.C. § 112, first paragraph, as containing subject matter that was not described in the specification in such a way as to reasonably convey to one skilled in the art that the inventor, at the time the application was filed, had possession of the claimed invention. Specifically, the Examiner indicate that the recitation of "incompressible backing member" is not supported by the specification.

The Examiner also rejected claims 55, 56, 69 and 84-89 under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 5,551,959 to Martin, et al. ("Martin"). The Examiner further rejected claims 57, 59, 70 and 72 under 35 U.S.C. § 103(a) as unpatentable over Martin in view of U.S. Patent No. 6,069,080 to James, *et al.* ("James"). Applicants disagree with these grounds of rejection and wish to clarify various distinctions of the embodiments of the applicants' disclosed invention over the cited art. Reconsideration is therefore requested in light of the present amendment and following remarks.

The disclosed embodiments will now be discussed in comparison to the prior art. It is understood, however, that the following discussion of the disclosed embodiments, as well as the discussion of the differences between the disclosed embodiments and the prior art subject matter do not define the scope or interpretation of any of the claims. Instead, such discussed differences are offered merely to help the Examiner appreciate important claim distinctions as they are discussed.

The various embodiments of the present invention are directed to polishing pads, apparatuses and methods for making polishing pads used in the manufacture of microelectronic devices. In an embodiment of the invention, a polishing pad has a backing member including a first surface and an opposing second surface. A plurality of pattern elements are distributed on the first surface of the backing member, and a hard cover layer is then applied over the pattern elements. The pattern elements thus define a plurality of contour surfaces that project away from the first surface of the backing member.

The cover layer at least substantially conforms to the contour surfaces of the pattern elements to form a plurality of hard nodules on the backing surface. The hard nodules

define abrasive elements to contact and abrade material from a microelectronic device substrate assembly. Accordingly, the cover layer defines at least a portion of a planarizing surface of the polishing pad. The cover layer is comprised of various inorganic materials. For example, the cover layer can be a thin layer comprised of silica nitride, ceria, silica, alumina, titanium nitride, titania, zirconia or other suitable metallic or ceramic materials.

In a pertinent embodiment of the invention, a polishing pad is manufactured by depositing a plurality of pattern elements over the first surface of the backing member, and then depositing the hard inorganic cover layer over the pattern elements. The pattern elements may be deposited onto the first surface of the backing member by drawing or pulling the backing member through a bath having a liquid having a plurality of the pattern elements suspended in the liquid, and then evaporating the fluid from the pattern elements and the backing member, leaving a plurality of pattern elements distributed on the first surface of the backing member. The hard cover layer may then be deposited over the pattern elements using a chemical vapor deposition process, plasma vapor deposition, or other similar processes suitable for forming thin films on a surface.

The backing member can be a continuous web that may be wrapped around a roller of a web format planarization machine, or the backing member may be cut into a circular shape for attachment to a platen of a rotary planarization machine. In either case, the backing material may be comprised of a compressible polymeric material. Suitable compressible polymeric materials include polyurethanes. Alternatively, the backing member may be comprised of a cured resin, so that the backing member is relatively incompressible.

The Examiner cites the Martin reference. Martin discloses an abrasive article having a sheet-like substrate that supports a plurality of abrasive particles and a hard carbon coating layer. With reference to Figure 1 of Martin, the disclosed invention is shown. A substrate 12 supports abrasive particles 15 that are retained on the substrate 12 by a make coat 14. A hard carbon coating layer 16 is applied to the abrasive particles 15 and the make coat 14. A size coat 18 then substantially covers the hard carbon coating layer 16. Thus, the carbon coating layer 16 does not adhere the abrasive particles 15 to the substrate 12. Referring now to Figure 2 of the Martin reference, the abrasive article again has a make coat 24 interposed between the abrasive particles 25 and the substrate 22. Again the carbon coating layer 28 does

not adhere the abrasive particles 15 to the substrate 12. The Martin reference therefore does not disclose or fairly suggest a cover layer comprised of a hard, inorganic material that retains particles on the substrate surface.

The Examiner has further cited the James reference. James discloses a method for manufacturing a fixed abrasive polishing pad by dispersing solid abrasive particles in an aqueous solution and spraying the solution onto a supporting substrate. James, however, does not supply the teaching missing from the Martin reference. Specifically, James does not disclose a cover layer comprised of a hard, inorganic material that retains particles on the substrate surface. Turning now to the claims, specific differences between the claim language and the applied art will be pointed out. Claim 55, as amended, recites in pertinent part: "A method of manufacturing a polishing pad for planarization of a microelectronic-device substrate assembly, comprising...covering the contour surfaces with a cover layer of *a hard inorganic material that retains the pattern elements on the backing member* and conforms to the contour surfaces to form nodules from the portions of the hard cover layer over the contour surfaces, the nodules projecting away from the first surface of the backing member." (Emphasis added). As described in detail above, the applied references, either singly or in combination do not teach this. Claim 55 is therefore allowable over the cited references. Claims depending from claim 55 are similarly allowable based upon the allowability of the base claim and further in view of the additional limitations present in the dependent claims.

Claim 69, as amended, recites in pertinent part: "A method of manufacturing a polishing pad for planarization of a microelectronic-device substrate assembly, comprising...*forming a layer of a hard inorganic material at least on the pattern elements to conform to the contour surfaces, the layer of hard inorganic material retaining the pattern elements on the polymeric backing member,* and the portions of the cover layer over the contour surfaces projecting away from the first surface of the backing member to define abrasive nodules. Again, the applied references do not disclose or fairly suggest this. Claim 69 is therefore allowable over the cited references. Claims depending from claim 69 are similarly allowable based upon the allowability of the base claim and further in view of the additional limitations present in the dependent claims.

With reference now to the Examiner's rejections under 35 U.S.C. § 112, first paragraph, claims 85 and 88 are amended to recite that the backing member is a *generally incompressible material* comprising a cured resin. Applicant respectfully asserts that this limitation is fully disclosed in the present application.

All of the claims remaining in the application are now clearly allowable. Favorable consideration and a Notice of Allowance are earnestly solicited.

Respectfully submitted,

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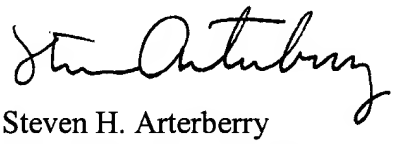

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Amendments to the Claims:

Please cancel claim 56 and amend claims 55, 57, 69, 85 and 88 as follows:

Listing of Claims:

1-54. (Cancelled)

55. (Currently Amended) A method of manufacturing a polishing pad for planarization of a microelectronic-device substrate assembly, comprising:

depositing a plurality of pattern elements over a first surface of a polymeric backing member, each pattern element directly contacting the first surface and having a portion projecting away from the first surface of the backing member;

forming a plurality of contour surfaces over a first surface of a polymeric backing member to project away from the first surface, the portions of the pattern elements projecting away from the backing member defining the contour surfaces; and

covering the contour surfaces with a cover layer of a hard inorganic material that retains the pattern elements on the backing member and conforms to the contour surfaces to form nodules from the portions of the hard cover layer over the contour surfaces, the nodules projecting away from the first surface of the backing member.

56. (Cancelled)

57. (Currently Amended) The method of claim [[56]] 55 wherein depositing a plurality of pattern elements over the first surface comprises coating the first surface with a liquid containing the pattern elements and evaporating the liquid to leave the pattern elements directly on the first surface of the backing member.

58. (Cancelled)

59. (Original) The method of claim 57 wherein coating the first surface with the liquid containing the pattern elements comprises spraying the first surface of the backing member with a solution including the liquid and the pattern elements.

60-68. (Cancelled)

69. (Currently Amended) A method of manufacturing a polishing pad for planarization of a microelectronic-device substrate assembly, comprising:

distributing a plurality of pattern elements over a first surface of a polymeric backing member, the pattern elements directly contacting the first surface and further defining a plurality of contour surfaces projecting away from the first surface of the backing member; and

forming a layer of a hard inorganic material at least on the pattern elements to conform to the contour surfaces, the layer of hard inorganic material retaining the pattern elements on the polymeric backing member, and the portions of the cover layer over the contour surfaces projecting away from the first surface of the backing member to define abrasive nodules.

70. (Original) The method of claim 69 wherein distributing a plurality of pattern elements over the first surface comprises coating the first surface with a liquid containing the pattern elements and evaporating the liquid to leave the pattern elements directly on the first surface of the backing member.

71. (Cancelled)

72. (Original) The method of claim 70 wherein coating the first surface with the liquid containing the pattern elements comprises spraying the first surface of the backing member with a solution including the liquid and the pattern elements.

73-79. (Cancelled)

80. (Withdrawn) A method of planarizing a microelectronic-device substrate assembly, comprising:

pressing a surface of the substrate assembly against a polishing pad including a backing member having a first surface and a second surface, a plurality of pattern elements distributed over the first surface of the backing member to define a plurality of contour surfaces projecting away from the first surface of the backing member, and a hard cover layer over the pattern elements and over portions of the first surface of the backing member exposed between pattern elements, the cover layer at least substantially conforming to the contour surfaces of the pattern elements to form a plurality of hard nodules projecting away from the first surface of the backing member, the nodules defining at least a portion of a planarizing surface of the polishing pad for engaging a microelectronic-device substrate assembly held by a substrate holder; and

moving at least one of the substrate assembly or the polishing pad to translate the surface of the substrate assembly across at least a portion of the hard nodules.

81. (Withdrawn) A method of planarizing a microelectronic-device substrate assembly, comprising:

pressing a surface of the substrate assembly against a polishing pad including a base section having a first surface, a plurality of contour surfaces above the first surface, and a second surface configured to be placed over a support table of a planarizing machine, and the polishing pad further including a plurality of abrasive elements projecting away from the base section to define at least a portion of a planarizing surface for engaging a microelectronic-device substrate assembly held by a substrate holder, the abrasive elements including raised portions of a hard cover layer over the contour surfaces that project away from the base section; and

moving at least one of the substrate assembly or the polishing pad to translate the surface of the substrate assembly across at least a portion of the abrasive elements.

82. (Withdrawn) A polishing pad manufactured according to a method comprising:

forming a plurality of contour surfaces over a first surface of a backing member to project away from the first surface; and

covering the contour surfaces with a cover layer of hard material that at least substantially conforms to the contour surfaces and to portions of the first surface of the backing member exposed between pattern elements to form nodules from the portions of the hard cover layer over the contour surfaces, the nodules projecting away from the first surface of the backing member.

83. (Withdrawn) A polishing pad manufactured according to a method, comprising:

distributing a plurality of pattern elements over a first surface of a backing member, the pattern elements defining a plurality of contour surfaces projecting away from the first surface of the backing member; and

forming a layer of a hard material on at least the pattern elements to at least substantially conform to the contour surfaces, the portions of the cover layer over the contour surfaces projecting away from the first surface of the backing member to define abrasive nodules.

84. (Previously Presented) The method of claim 55, wherein forming a plurality of contour surfaces over a first surface of a polymeric backing member includes forming the plurality contour surfaces on a compressible polymeric backing member.

85. (Currently Amended) The method of claim 55, wherein forming a plurality of contour surfaces over a first surface of a polymeric backing member includes forming the plurality contour surfaces on [[an]] a generally incompressible polymeric backing member comprised of a cured resin.

86. (Previously Presented) The method of claim 55, wherein forming a plurality of contour surfaces over a first surface of a polymeric backing member includes forming the plurality contour surfaces on a backing member comprised of a cured resin.

87. (Previously Presented) The method of claim 69, wherein distributing a plurality of pattern elements over a first surface of a polymeric backing member includes distributing the plurality of pattern elements on a compressible polymeric backing member.

88. (Currently Amended) The method of claim 69, wherein distributing a plurality of pattern elements over a first surface of a polymeric backing member includes distributing the plurality of pattern elements on [[an]] a generally incompressible polymeric backing member comprised of a cured resin.

89. (Previously Presented) The method of claim 69, wherein distributing a plurality of pattern elements over a first surface of a polymeric backing member includes distributing the plurality of pattern elements on a backing member comprised of a cured resin.